Ozone National Ambient Air Quality Standard Health Exceedances on August 30, 2019

Exceedance Locations and Levels

On Friday, August 30, 2019, there were no exceedances in New Jersey of the National Ambient Air Quality Standard (NAAQS) for ozone (daily maximum 8-hour average of 70 ppb). See Table 1.

Table 1. New Jersey Ozone Concentrations on 8/30/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	51
Bayonne	54
Brigantine	46
Camden Spruce St	63
Chester	56
Clarksboro	58
Colliers Mills	57
Columbia	51
Flemington	57
Leonia	55
Millville	49
Monmouth University	55
Newark Firehouse	58
Ramapo	55
Rider University	55
Rutgers University	59
Washington Crossing*	57
TOTAL EXCEEDANCES	0

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clear Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were three (3) exceedances of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on 8/30/2019

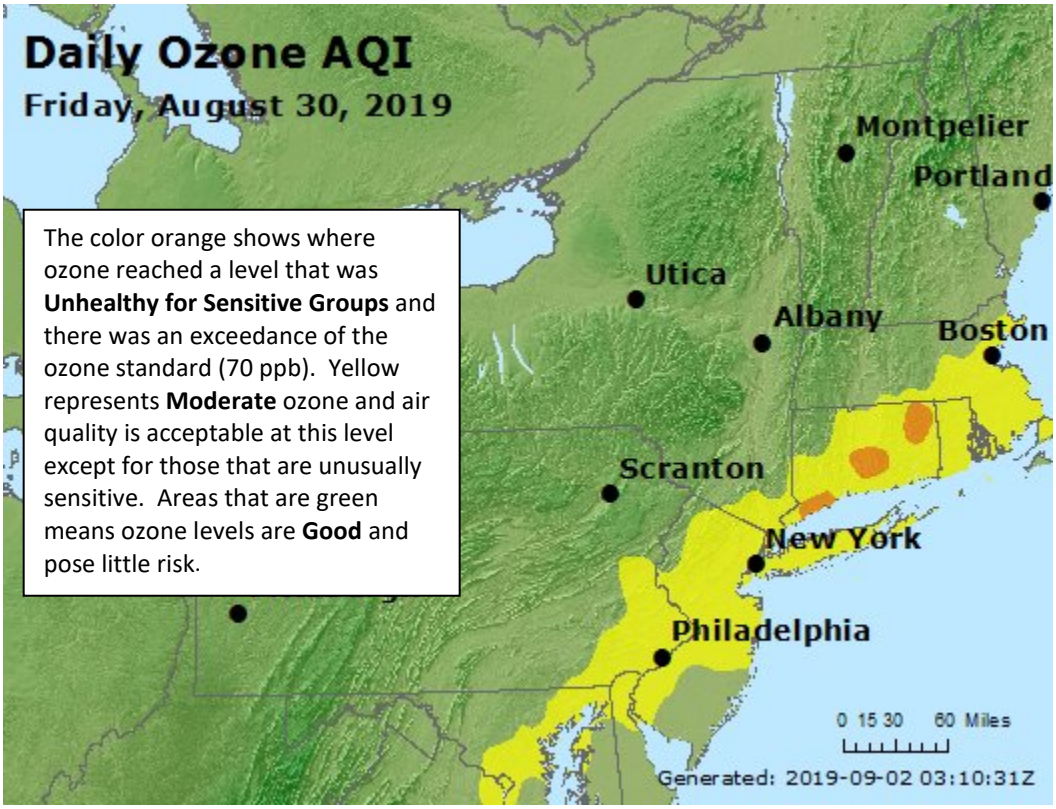
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	60
CT	Greenwich	65
CT	Madison-Beach Road	67
CT	Middletown-CVH-Shed	76
CT	New Haven	64
CT	Stratford	71
CT	Westport	73
DE	BCSP (New Castle Co.)	69
DE	BELLFNT2 (New Castle Co.)	66
DE	KILLENS (Kent Co.)	47
DE	LEWES (Sussex Co.)	45
DE	LUMS 2 (New Castle Co.)	58
DE	MLK (New Castle Co.)	65
DE	SEAFORD (Sussex Co.)	50
MD	Fair Hill	66
NY	Babylon	57
NY	Bronx - IS52	57
NY	CCNY	53
NY	Fresh Kills	58
NY	Holtsville	55
NY	Pfizer Lab	57
NY	Queens	65
NY	Riverhead	58
NY	Rockland Cty	55
NY	White Plains	58
PA	BRIS (Bucks Co.)	61
PA	CHES (Delaware Co.)	65
PA	NEWG (Chester Co.)	69
PA	NORR (Montgomery Co.)	61
PA	LAB (Philadelphia Co.)	57
PA	NEA (Philadelphia Co.)	61
PA	NEW (Philadelphia Co.)	65
	TOTAL EXCEEDANCES	3

The number of days in 2019 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2019

STATE	# of Days NAAQS was Exceeded January 1 – August 30, 2019 NAAQS = 70 ppb
Connecticut	19
Delaware	3
Maryland	2
New Jersey	12
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for August 30, 2019



Source: www.airnow.gov

For ozone terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: http://nj.gov/dep/baqp/glossary.html

Weather

On Friday, August 30th, high pressure centered off the coast of North Carolina brought southwesterly winds to the region, providing warm temperatures and mostly sunny skies. Cloud cover over northern New Jersey and New York along with a relatively clean air mass the previous day led to isolated exceedances in Connecticut.

Early on Friday, high pressure was centered off the North Carolina coast and shifted the winds out of the southwest. This shift in wind direction brought in a warmer and more humid air mass to the nonattainment area causing temperatures reach the mid to upper 80's across the region. A cold front located over the Great Lakes also started to push eastward with a prefrontal trough that reached the region by mid-afternoon. This trough along with increasing moisture fueled clouds over northern New Jersey, New York City, and Long Island which inhibited ozone production. Southern New Jersey and Connecticut saw abundant sunshine throughout the day which enhanced ozone production in these areas. However, due to the cold front that moved through the previous day, the air was relatively clean on Thursday which prevented ozone from reaching the unhealthy for sensitive groups (USG) category in southern New Jersey. The favorable meteorological conditions mentioned above, along with the transport of pollutants along the I-95 corridor, allowed ozone to reach the USG category in multiple areas in Connecticut.

Despite the ozone limiting factors in New York and New Jersey, warm temperatures, sunny skies, southwesterly winds and a pre-frontal surface trough caused ozone levels to exceed the 8-hour average NAAQS for ozone in Connecticut.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on August 30, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone exceedances. Three (3) monitoring stations with an 8-hour average ozone exceedance were used to run back trajectories. The selected sites and 8-hour average ozone levels recorded are listed in Table 4 below.

Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that Were Selected to Run 48-hour Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Middletown	76
CT	Stratford	71
CT	Westport	73

Backward trajectories from August 30th show that air was highly influenced at all levels of the atmosphere by a large high-pressure system located in the central United States in the days leading up to this ozone event. Despite a regionally clean air mass, westerly winds provided transport of ozone precursors into Connecticut from upwind locations in the Ohio River Valley as the center of high pressure migrated into the southeastern United States and off the coast. This pattern, in combination

with favorable weather conditions mentioned above led to three exceedances in Connecticut on this day.

Surface level backward trajectories (Figure 2) originated over Lake Michigan initially at 1500m and traveled eastward over Michigan, including the city of Detroit, where air may have picked up emissions from local industry. During the previous day, the trajectories made a quick descent to lower levels allowing any ozone aloft to be transported down to the surface while traveling in a southeasterly direction over southern Ontario and central Pennsylvania. Surface trajectories made a turn toward the northeast and passed through Philadelphia, New York City, and Long Island picking up emissions from cars, trucks, and industry before reaching its destination.

Mid and upper level backward trajectories (Figures 3 & 4) followed similar transport pathways. Mid-level trajectories originated in the upper Mid-west and traveled generally eastward over Illinois and Indiana. Meanwhile, air at higher levels originated in Kansas and traveled in a predominately easterly direction around the perimeter of the high-pressure system. Air at both levels continued to travel eastward through the heavily industrialized Ohio River Valley transporting additional emissions from local industry and power plants. Air at higher levels, the trajectory then passed over New York City before finally arriving at its endpoint in Connecticut.

Figure 5 shows the national Air Quality Index observed on August 29th, the day prior to the exceedance event. As shown in the figure, a few isolated areas in the Mid-West reached the moderate category the day before. Despite relatively good air quality the previous day, westerly winds were able to transport a plume of ozone precursors from the Ohio River Valley, over Metropolitan New York, and into Connecticut. Along with favorable weather conditions mentioned above, ozone levels were able to reach the unhealthy for sensitive groups category in isolated locations of Connecticut on August 30th.

Figure 2. 48-hour Back Trajectories for August 30, 2019 at 10 meters

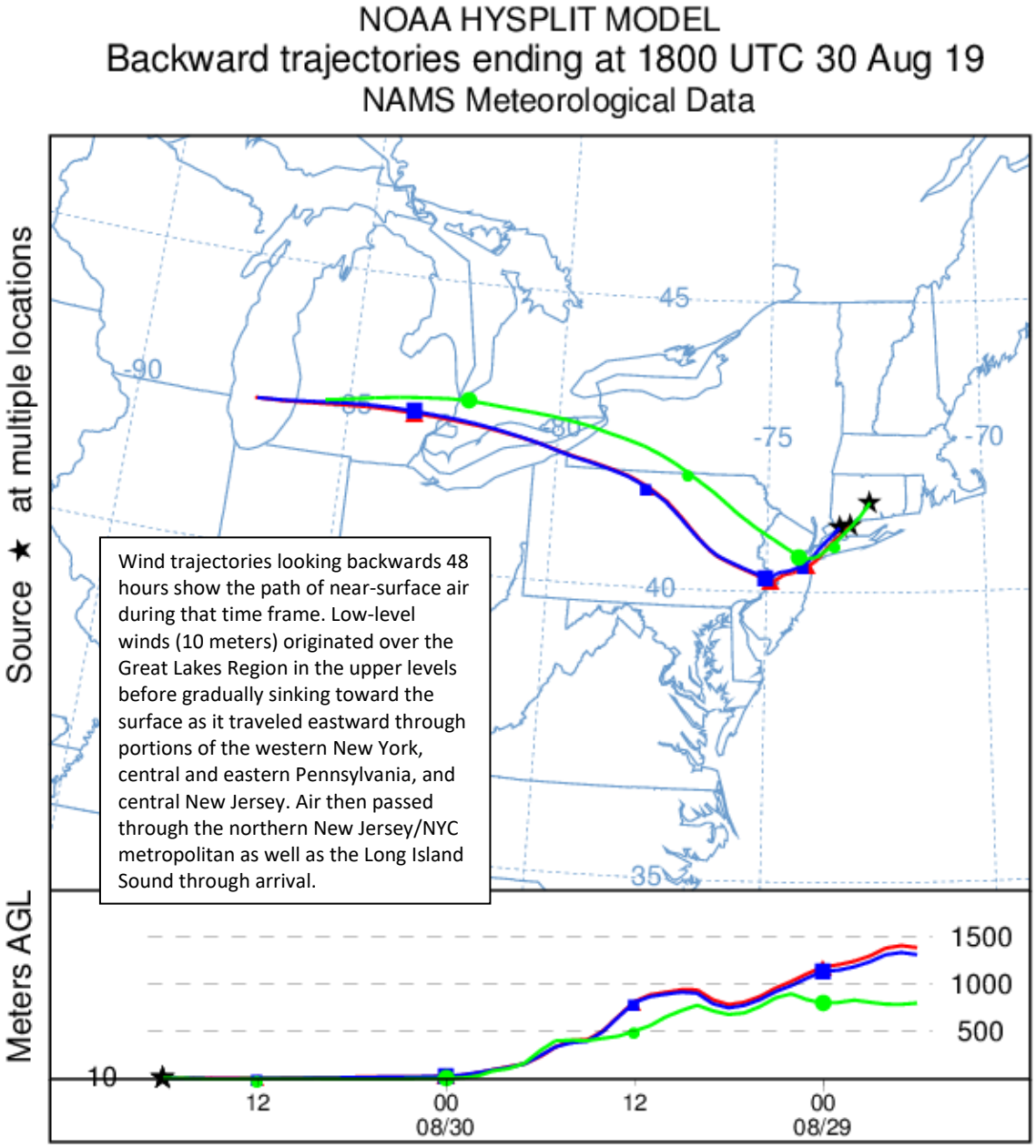


Figure 3. 48-hour Back Trajectories for August 30, 2019 at 500 meters

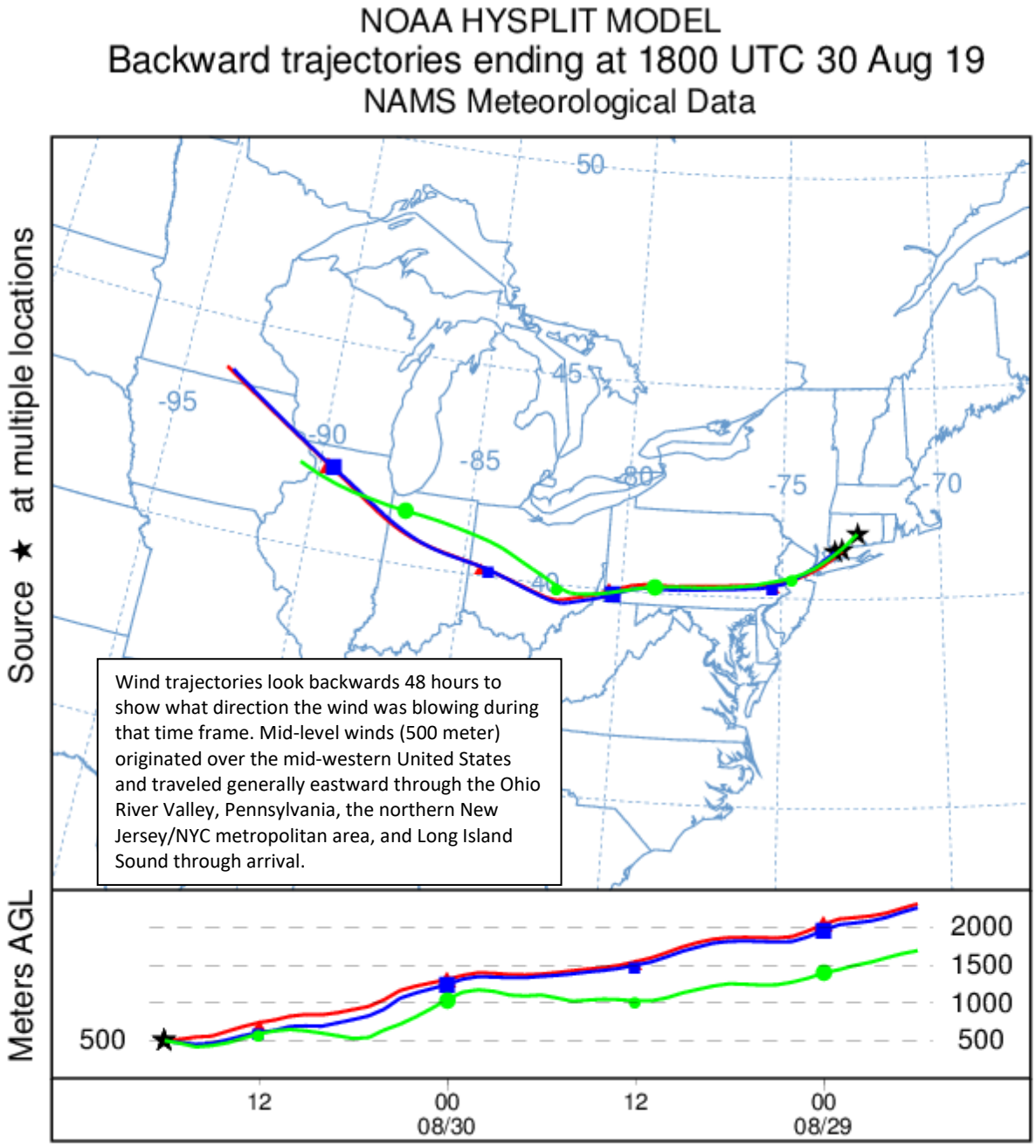


Figure 4. 48-hour Back Trajectories for August 30, 2019 at 1500 meters

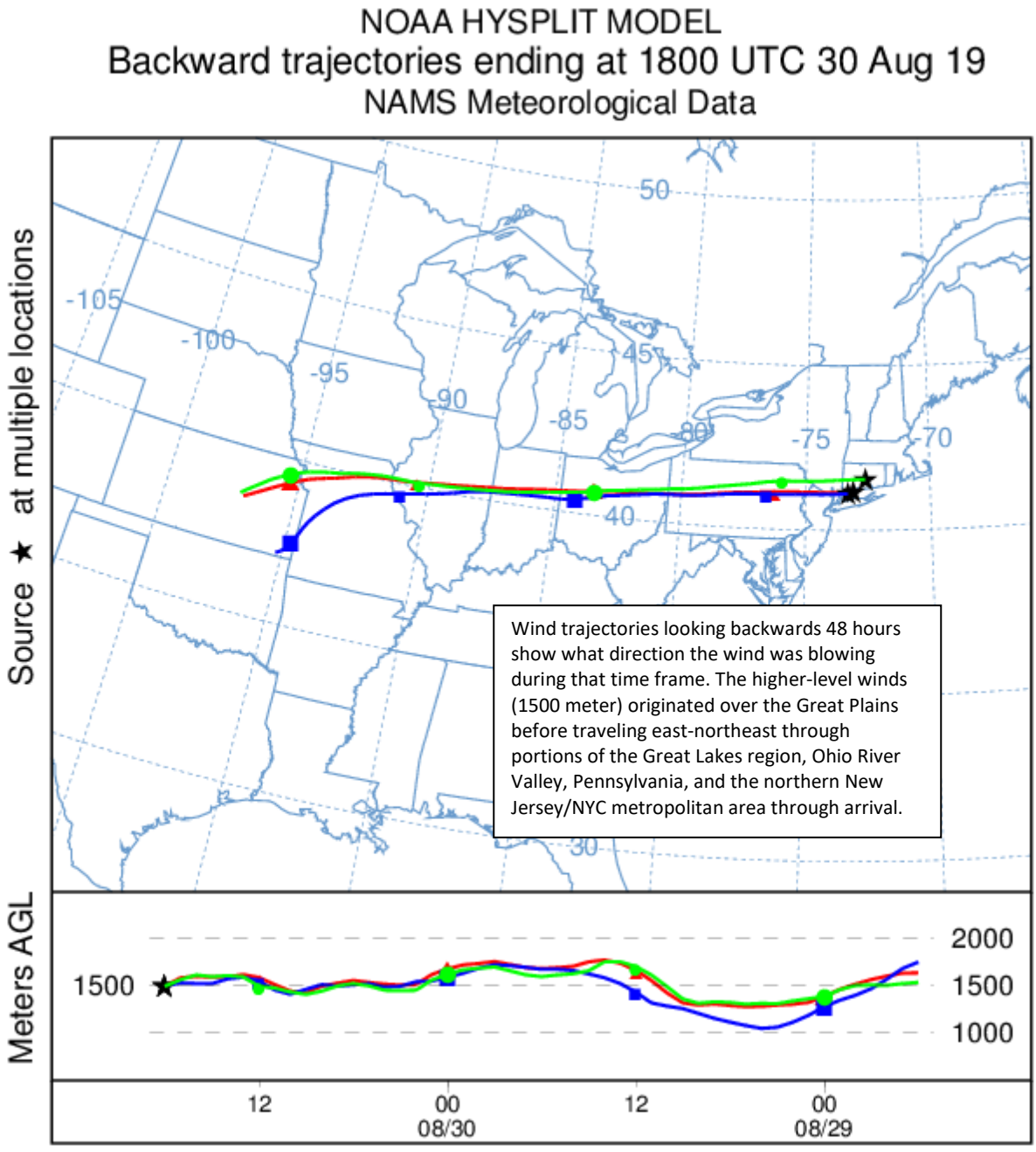
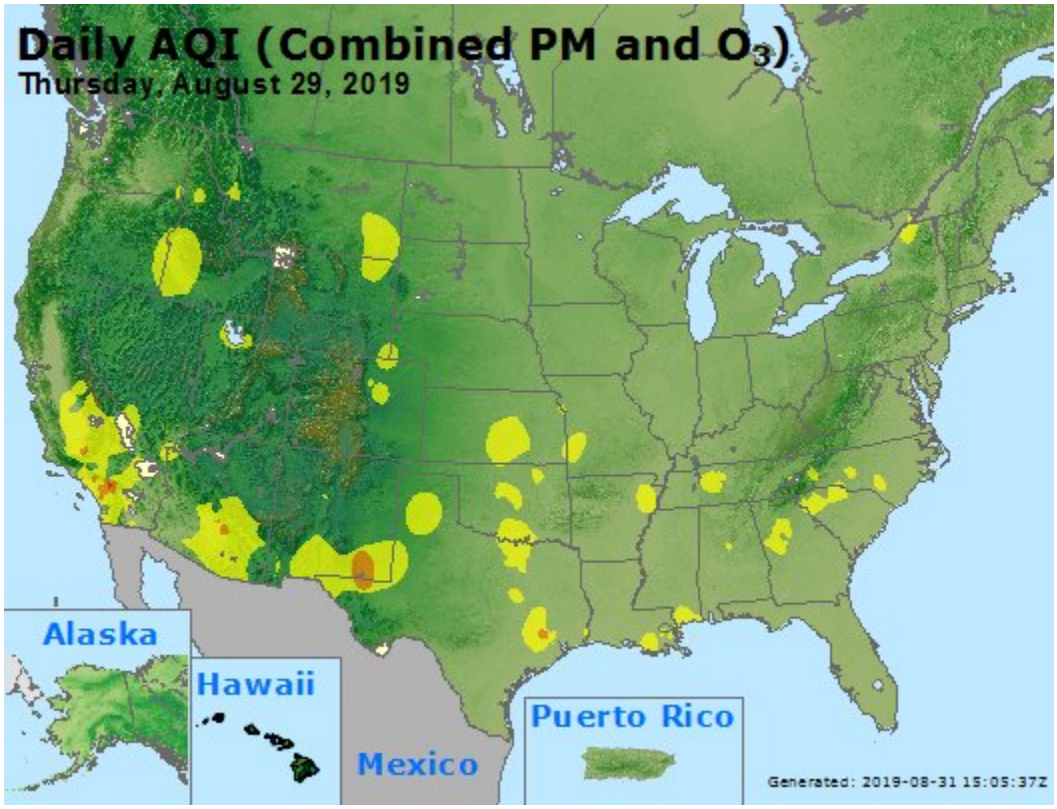


Figure 5. Combined Air Quality Index for the United States on August 29, 2019



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of health effects and negatively impact air quality and the environment in New Jersey. Ozone is formed when oxides of nitrogen (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone can irritate any person's lungs, but the effect may be more pronounced for those with existing lung-related deficiencies, and therefore, one should take extra precautions on bad ozone days.

Find Out About Air Quality Every Day

The "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ tells you how to sign up to receive notifications and find out when your local air has reached unhealthy ozone levels.